Gas Journal

VOL. 300 111th YEAR LONDON, NOVEMBER 11, 1959 No. 5019 PRICE 1/6

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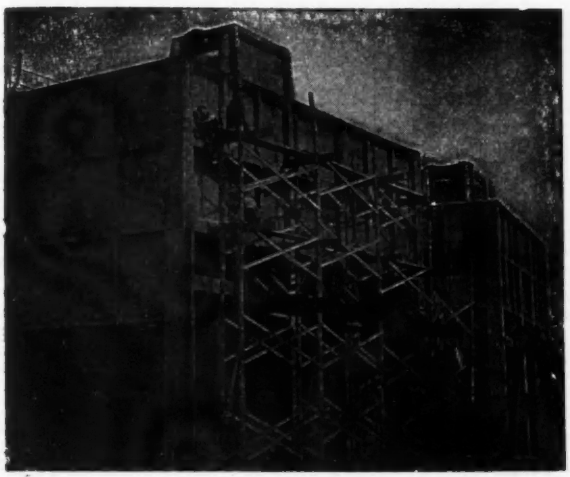

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Gas Journal

VOLUME 300 No. 5019 NOVEMBER 11, 1959 111th YEAR

New Techniques from America or Europe?

LAST year the two winners of the Institution's award on behalf of the Woodall-Duckham Educational Fund, Mr. A. R. Bovington and Mr. W. H. Dobson, spent some three months in the United States studying the American gas industry. While there they both took courses at the Institute of Gas Technology at Chicago, after which they separately visited gasworks, mainlaying projects and other activities of the American industry.

Towards the end of last year, we published an account of Mr. Bovington's experiences which he had given at a meeting of the Eastern Juniors, and in our issue this week we are publishing an abstract from a paper by Mr. Dobson on his experiences, read to the Midland Juniors.

Both these accounts, we find, are of the greatest interest, but it is unfortunate that we are unable to fully illustrate them with the lantern slides shown in both cases. For it is the effect of these on the audiences that prompted many of the points raised in the discussions; in other words, the visual impact alone was sufficient to reveal the differences in techniques used here and abroad and to suggest details which rendered them unsuitable for British practice. In those cases where the comments were adverse it was noticeable that the lecturer in each case had experienced the same reaction on the spot and had questioned his American guide, for he had a convincing reply ready to hand.

The conclusion we must draw from this is probably the obvious one, that techniques cannot be transplanted from one country to another without some, and perhaps considerable, modification. A particular case in point is the modern mechanised methods of mainlaying. The use of American designed excavating machinery and the stringing out of pipes for continuous welding into long lengths before placing in the trench has, with certain modifications, been very successfully adopted in the United Kingdom. The contractors who carry out most of the mainlaying work for the industry have invested in the modified American plant. This has greatly assisted in the laying of many connecting mains such as the North Thames Board's Canvey-Shell Haven-Romford main and the Southern Board's backbone main, both of which are contributing greatly to the cheapened gas production in both these Boards' areas.

The United States is noted for the excellence of her technological developments. This perhaps is one of her greatest contributions to the modern world. She has seen possibilities in inventions or discoveries made by other countries before those ensuing countries have realised them themselves. The excellence of her workmanship is well known, and the technological progress in her ability to mass produce a great many things with a very high standard of finish is the admiration of many countries; but will that always be so? It would seem that a great many new ideas of a fundamental nature are conceived in Europe, and for economic reasons are attracted to the United States where they can be developed and successfully launched by big business.

We in this country were impressed by the laying of the very long gas transmission mains from Texas to the Eastern Sea Board, carrying natural gas to the populated and industrially developed areas. It is not impossible, however, that had natural gas been found on the north Scottish coast, it would have been equally successfully piped to London, the industrial parts of Scotland or the Midlands to replace manufactured gas at considerable saving in production costs, but at considerably greater cost in time and money without the American techniques.

This particular point brings us back to Europe and to consider what is now happening on the Continent. In France, with the discovery of the natural gas deposits at Lacq in the south-west, an immense fillip has been given to the French gas industry. Not only has a new source of gas become available but also a most valuable source of sulphur, making France a competitor with the United States in the world's markets for the supply of this commodity. The policy for the supply of natural gas in France is, however, fundamentally different from that in the United States. In France, except for Paris, the supply will mostly be to industry and not so exclusively to the domestic consumer as in the States. This will have the effect of developing areas in France which have hitherto been

largely agricultural; in fact per head of the population gas consumption has always been considerably below that in England; by far the greatest proportion in the whole country being in Paris.

Where will the future award-winners visit? Will they again visit the United States or will they stay nearer home and visit France, Germany, or perhaps Russia if she will grant the necessary permission?

To such a question it is difficult to give a direct answer. Will the increased prosperity of Europe and with it the increased industrial activity, make her quite independent of the United States as a source of many durable consumer goods? Will this increased activity keep Europe's brilliant scientists and able technologists at home and make it unnecessary for them to emigrate?

With the discovery of a cheap and abundant energy and the development of her oilfields in the Sahara, France may well become independent of the Middle East and herself become an exporter of oil and perhaps natural gas to Switzerland and Germany. This country, having failed to discover any large quantities of natural gas so far, will either have to find other means of gas-making from coal or else import natural gas. The success of the experiments on shipping it in liquid form is most encouraging, but this source might even be augmented by supplies in gaseous form direct from France.

We think, then, that having mastered the laying of long distance transmission mains and modifying it to our own special needs, the British gas industry will become steadily more interested in developments in Europe. Our interests in methods of gas production are likely to increase as our efforts to cut the cost of gas to the consumer become more intensified.

From Mr. Bovington's address we gathered that by 1985 supplies of natural gas in the United States were likely to fall away to nothing. Intense efforts are therefore being made to find other means of gas making from coal and oil shale—there are large quantities of this in Canada as well—so it seems likely that manufactured gas may well be in demand before the end of the century. In this particular way Europe may be able to make some return to the new world for her spectacular advances in technology in the last hundred years.

Meeting Fuel Problems Half Way

THERE will be no dissent from the view that during the last few years the fuel situation in this country has undergone a drastic change. The confident forecasts of three or four years ago that by 1960 we should be experiencing a serious shortage of coal have proved wide of the mark. We do not believe, however, that this is entirely due to the sharp increase in the use of oil; nor, we fear, is the increase in the efficiency of fuel usage, gratifying though it is, sufficient to explain the growing accumulation of coal stocks in spite of the reduction in output.

Since the changed situation has created a number of problems, the Combustion Engineering Association recently organised a 'Forum' at the Queen's Hotel in Birmingham, at which some of these problems, particularly those affecting industrialists with small or medium boiler plant, could be freely and openly discussed.

At an informal Press conference under the chairmanship of Mr. H. M. Hollands, Chairman of the Midland Regional Committee of the Central Electricity Authority, held before the meeting, Brigadier J. V. Topham, Director of the Association, outlined the Association's constitution and methods.

The Combustion Engineering Association is well fitted to hold such a forum as this. Brigadier Topham explained how it differed from the Institute of Fuel in that the Institute is concerned with the science and technology of fuel and the Association is mainly concerned in its application to industrial uses. In a supplementary remark Captain Gregson suggested that it was concerned with a triangle, the availability of fuel in its several forms, the appliances available for its use and the uses to which they are best applied.

By the looseness of its constitution the Association is able to discuss these matters without the inhibitions imposed by the Charter under which the Institute of Fuel is obliged to operate. The user states his problem and the fuel supplier and the appliance manufacturer freely and openly put forward the solutions they are prepared to offer, whether this is 'advertising' or not.

At the forum itself, presided over by the Lord Mayor of Birmingham, Alderman John A. Lewis, questions sent in by post were answered by a panel of experts nominated by the several interests concerned—the National Coal Board, the National Industrial Fuel Efficiency Service (NIFES), the West Midlands Gas Board, the leading oil companies, local boiler makers, combustion appliance manufacturers, and industrial fuel users.

Though the forum was mainly concerned with solid and liquid fuels, we were glad to note that the Gas Board had appointed to the panel a specialist in industrial gas as well as in the use of coke. In fact, we considered his presence a most valuable addition to any such meeting and we would congratulate the West Midlands Gas Board on its forethought in taking advantage of so excellent an opportunity.

The forum was principally concerned with small and medium sized boiler plants both of which are eminently suitable for conversion from solid fuel to gas firing though, as many will agree, their conversion from coal firing to coke firing is almost as satisfactory a conversion as far as our industry is concerned.

The questions submitted covered a wide range of subjects connected with fuel and its uses, among which were the choice and availability of fuels, operating costs, maintenance of appliances, plant selection, personnel and the repercussions of the Clean Air Act.

Such meetings are, we think, particularly helpful in strengthening the three sides of the triangle referred to by Captain Gregson, by bringing together representatives of each to ensure a stable structure. Perhaps one of the most difficult tasks of the organising committee was to select the comparatively few questions to be answered in the time available.

Personal notes

MISS EMMELINE MANN retired last week after completing 40 years' service in the gas industry. She joined the Gas Council, then known as the National Gas Council, in 1919, as secretary to Mr. E. J. Fattrell, the joint manager of the Council. She accompanied him from the Ministry of Munitions, where she had been his personal assistant. Soon after her arrival, Miss Mann was appointed to take the minutes of the Central Executive of the National Gas Council. Her work has also included the taking of minutes at the meetings of the Publicity Managers' and the Commercial Managers' committee meetings, and during the 40 years, she has been connected with practically every department of the gas industry's headquarters in London. Miss Mann comes from a well-known family—her father was Tom Mann, the well-known labour leader, who died in 1941. Apart from taking down other people's words, Miss Mann has had some success as a writer in her own right, and a number of her articles have been published in newspapers and magazines. She plans to continue this side of her life following her retirement. At a ceremony at the opening of the monthly meeting of the Gas Council recently, a cheque was presented to Miss Mann by the Chairman of the Gas Council, Sir Harold Smith. She intends to spend the money on a portable typewriter.

MR. D. ASH, MR. EDWARD E. DUERDOTH and MR. E. C. T. WILSON have been appointed to the sales staff of International Boilers and Radiators for the Midlands and Western area, the London area and the Northern area, respectively.

MR. ERNEST GEORGE BROOKS has been appointed a Director of the De La Rue Co. Ltd. He is already Managing Director of Thomas Potterton Ltd., which is a member company of the De La Rue group and which manufactures gas-fired and oil-fired boilers.

MR. DESMOND ROBLIN has been appointed a Representative for Sidney Flavel & Co. Ltd., in the West Midlands and Wales Gas Boards areas, under the control of the Area Manager, Mr. John Flavel. Mr. Roblin was with the Wales Gas Board for eight years, for five years on the sales staff of the Cardiff undertaking, after which he was transferred to the headquarters staff as personal assistant to Mr. T. Tyrrell, Domestic Sales and Service Officer. MR. J. E. KITCHING has been appointed the company's Representative for the Southern and South Western Gas Boards areas, under the control of the Area Manager, Mr. D. C. Foote. Mr. Kitching, after serving in the R.A.F. for eight years, joined Block & Anderson Ltd., for whom he was a representative for two years.

FURTHER CHANGES AT BRATT COLBRAN

FURTHER administrative changes are announced by Bratt Colbran Ltd.—the re-organised Radiation company, which now embraces all central heating interests within the Radiation Group. The Technical Sales Office for all Bratt Colbran central heating activities will continue to operate under MR. R. G. WILSON at Bratt Colbran Ltd., 10, Mortimer Street, London, W.1. The Commercial Sales Office for central heating has, however, been integrated with the existing Bratt Colbran Sales Office for gas fires and industrial overhead radiant heaters. Orders for all Bratt Colbran products will in future be dealt with by Bratt Colbran Ltd., Lancelot Road, Wembley, Middlesex.

MR. P. E. JACKSON has now taken over the South Wales area as Technical Sales Engineer for Erskine, Heap & Co. Ltd., Lancashire Switchgear works, Manchester, 7. Mr. Jackson became resident in the Bristol area at 54, Station Road, Shirehampton, when he took over the South West of England area in August; he will now cover both areas from his address in Bristol.

M.P.s to seek procedural changes

THE Conservative party's back-bench power committee intends this session to tackle the question of 'improving' the Parliamentary procedure for discussing the nationalised industries.

The committee will submit its ideas on how more information might be obtained from Ministers at question-time on matters previously regarded as day-to-day administration and management.

At a meeting last week the back-bench committee showed firm resolve to make its opinion felt regarding seven aspects of Government responsibility: Coal, gas, electricity, oil, steel, atomic energy and hydro-electric power.

Special sub-committees on oil and on atomic energy have been set up.

Obituary

MR. FRANK WHITE, T.D., former chief supply officer of the South Eastern Gas Board, died recently. He was educated at St. Dunstan's College, Catford, and the City and Guilds (Engineering) College, later receiving workshop training at the Royal Ordnance Factory, Woolwich. After joining the South Metropolitan Gas Company as an engineering designer in 1920, he re-joined the Territorial Army, ultimately retiring with the rank of lieutenant-colonel, with nearly 20 years' service. His appointments in the industry include those of civil engineer of the South Metropolitan Company and station engineer at East Greenwich works. In 1946 he became the company's distribution engineer and he was made chief supply officer, South Eastern Gas Board, in 1949, in which capacity his duties included, *inter alia*, responsibility for the Board's transport and also the appliance and meter repair workshops. As a member of the Institution of Gas Engineers, Mr. White did considerable work on its behalf in the field of technical education and, among other things, served on the Board of Examiners, on the Education and Gas Distribution Committees and, as the Institution's representative, on the Joint Committee of the Ministry of Education and the Institution of Civil Engineers. Mr. White was one of the original members of the Institute of Public Supplies Officers and played a consistent part in the development of that Institute. He was chosen to become its vice-chairman in 1955 and was elected president in 1957. He leaves a widow and two children.

Diary

November 12. — INSTITUTE OF FUEL, MIDLAND SECTION: Birmingham 'Flue Gas Additives,' by E. Brett Davies. Davies. 6.30 p.m.

November 13.—LONDON AND SOUTHERN JUNIORS: Westminster Technical College, Vincent Square, London, S.W.1. General meeting and paper on 'Industrial Gas in the South East,' by W. J. Hewitt, S.E.G.B.

November 13.—I.G.E. MANCHESTER AND DISTRICT SECTION: Queen's Hotel, Manchester. Autumn General Meeting including paper by J. W. Rodgers entitled 'In Our Time.' Meeting preceded by luncheon at 12 noon.

November 14. — YORKSHIRE JUNIORS: Sheffield Technical College. Paper on 'Education,' by L. Howson, Lecturer in Gas Subjects, Sheffield Education Committee.

November 16.—NORTH EASTERN G.C.C.: Bridge Street, Leeds. Council Meeting.

November 16.—ROYAL INSTITUTE OF CHEMISTRY: Leeds University. A.G.M. 'Petroleum Refining: A View of Today and Tomorrow,' by E. le Q. Herbert.

Southport for Manchester Juniors President's Day

THE seaside resort of Southport, on Lancashire's west coast, was the venue chosen recently for President's Day of the Manchester and District Junior Association of Gas Engineers, when members and their friends toured Crowlands works, where Mr. N. Olsen, the President-elect, is Station Engineer.

During the tour of the works, members saw the new coal and coke handling plant, complete with control house containing a mimic panel, the flume controlled, grit catching pit dealing with the works' effluent, the reconstruction in progress to one bench of vertical retorts, the new water chlorination plant and the rearranged rail sidings.

Following the tour, members were conveyed to the Eastbank Street showrooms where the 61st annual general meeting, opening the 1959-60 session was held.

The members were welcomed to Southport by Mr. W. Hodkinson, Deputy Chairman of the North Western Gas Board and an Honorary Member of the Association, who was accompanied by Mr. J. Castle, General Manager of the Mersey Group, and Mr. W. S. Hubbard, the Production Engineer.

During the meeting, the President, Mr. J. Hepworth, presented the Col. Carr Memorial Prize to Mr. F. S. Gray and the F. Johnston Prize to Mr. R. S. Coates for papers presented during the past session. Mr. W. Hodkinson presented the North Western Gas Board Silver Medal to Mr. A. R. Gibson for a paper presented during the 1956-57 session. Mr. Hodkinson also, on behalf of the Society of British Gas Industries, presented the Society's Silver Medal for 1958 to Mr. H. Dobson.

The retiring President presented his successor with the President's Medallion, and Mr. Olsen presented a Past President's badge to Mr. Hepworth. Following the meeting members were entertained to tea.

FIRE AT BRADFORD —NO SUPPLIES CUT

A FIRE broke out in the roof of the water gas plant building at the Birkshall gasworks, Bradford, last week, caused by a spark from a gas retort igniting the roof. About 5,000 sq. ft. of roofing was damaged, but still remained watertight, for the outbreak burnt the bitumen off the corrugated iron sheeting without going through.

Some damage was also caused to wiring and a control panel and one of the four plants making gas from coke and oil was consequently idle during the morning. Although this meant that 800,000 cu.ft. of gas was not made, it would have no effect on Bradford's supply, according to a spokesman. Bradford Fire Brigade attended the outbreak.

£300,000 Chinese order for Neal

AS a result of an approach made to the company by China some months ago, R. H. Neal & Co. Ltd., the mobile crane manufacturers of Ealing and Grantham, announce the signing of contracts with the Chinese People's Republic worth more than £300,000. These contracts are for the supply of the company's standard mobile cranes, and the total order is believed to be the largest placed by the Chinese authorities for this class of equipment anywhere in western Europe.

The cranes are of six and 15 tons capacity (British rating) and will, among other duties, be used in various ports. As regards future business with China, the company looks upon the market as one offering long term prospects.

New office block

An extra 8,000 sq. ft. of space in a new two-storey office block will be made available shortly to house the administration, production, design and development departments of British Furnaces Ltd., Chesterfield.

S.W. SECTION A.G.M. AT BRISTOL

THE annual general meeting of the South Western Section of the Institution of Gas Engineers was held at Bristol recently. The proceedings were presided over by the chairman Mr. G. F. Oliver, M.B.E.

Mr. Oliver welcomed the guests, including Dr. W. T. K. Braunholtz, O.B.E., Secretary of the Institution, together with the Deputy Chairman of the South Western Gas Board, Mr. James Carr, O.B.E.

The following officers were elected for the ensuing year :— Chairman, Mr. A. C. Rea; Senior vice-Chairman, Mr. T. W. Jackson; Junior vice-Chairman, Mr. R. J. Williams; District Member of Council, Mr. G. F. Oliver, M.B.E.; Honorary Secretary, Mr. F. C. Gay, M.B.E.; and Honorary Treasurer, Mr. A. J. Jellis.

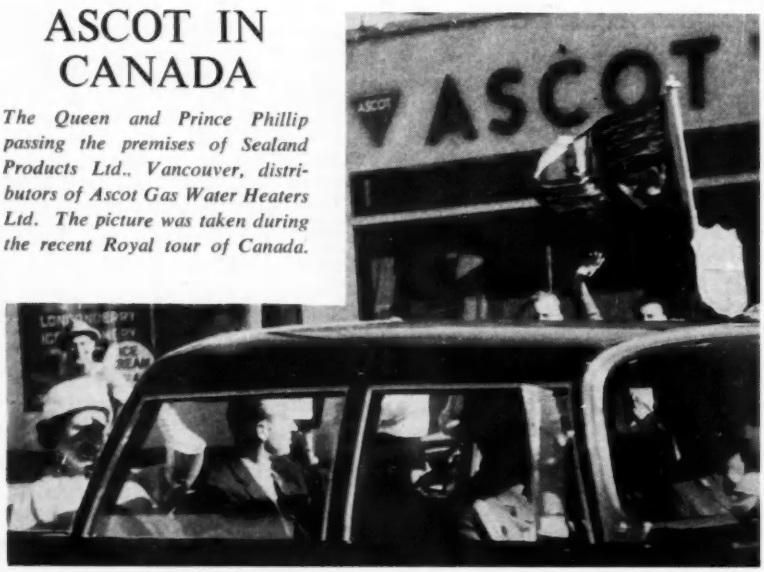
The associate membership examination certificate in gas engineering (manufacture) was presented to Mr. A. J. Davis, of Swindon.

On introduction by the Honorary Secretary and Treasurer, the annual report and accounts for 1958-59 were adopted.

Mr. Oliver was presented with his past chairman's badge, together with a clock as a memento of his year of office.

ASCOT IN CANADA

The Queen and Prince Phillip passing the premises of Sealand Products Ltd., Vancouver, distributors of Ascot Gas Water Heaters Ltd. The picture was taken during the recent Royal tour of Canada.



Last journey

TWO gasworks locomotives recently disposed of by the Scottish Gas Board are to be preserved.

One, a narrow-gauge pug locomotive built over 60 years ago, has been acquired by Mr. Ian Fraser of Arbroath, a steam engine enthusiast. He will put it in his 'palace of engineering,' which he is building beside his new house. A narrow-gauge track for the engine will be laid in the garden surrounding his home. The erection of the engine shed was the subject of a public inquiry when Arbroath Town Council refused planning permission for it. The permission Mr. Fraser sought was given by the Secretary of State for Scotland.

The other Scottish Gas Board engine has gone to the Railway Preservation Society's museum at Towyn, in Wales.

Transporting a 120-ft., 100-ton absorber by road to the Isle of Grain

This vessel is the first of two absorbers, each 120 ft. high, built for the South Eastern Gas Board's Isle of Grain works. The Woodall-Duckham Construction Co. Ltd. is there, building a high-pressure oil gasification plant, incorporating a high-pressure CO_2 removal installation, in which the absorbers will be embodied. This vessel, built by G. A. Harvey & Co. (London) Ltd., had to be transported from Greenwich. A Hayes (Middlesex) haulage contractor, Annis & Company, was given the job and a police escort. A straight run **(top)** *presented no major headaches, but a right-angled turn* **(right)** *was somewhat different. However, with a rear trailer equipped with its own steering mechanism, a device patented by the haulier, the 100-ton absorber was inched into position to continue its journey. Both absorbers have been designed for working pressures of about 20 atmospheres.*

Pictures by courtesy of Woodall-Duckham Construction Co. Ltd.

East Midlands 'Texas-style' pipe-line plan to cost £750,000

A Texas-style pipe-line project costing about £750,000, to take gas from the giant steelworks in Scunthorpe to towns and villages down as far as Lincoln, has just been started by the East Midlands Gas Board.

Lincoln gasworks at the southern end of the new pipe-line will continue to make gas. The works will be particularly important in carrying almost the whole of the load fluctuation on the grid and in meeting peak gas demands during winter months. Scunthorpe works will be the key distributing station, sending out gas received from the steelworks. New plant to take the supply is being built at the present time.

The 130 men working under contract for Constructors John Brown Ltd., who will be engaged on the project when the pipe-line gets fully under way next spring, will live right beside the pipe-line in caravans, moving on with it as it spans the two towns. The scheme has to be completed by October 1 next year, for on that date the Board starts to receive coke oven gas made in the Scunthorpe steelworks.

American technique

Mr. Bernard Clarke, General Manager of the Lincolnshire Division of the Board, said that the new scheme is an extension to the North Lincolnshire grid main which went into operation in September, 1957.

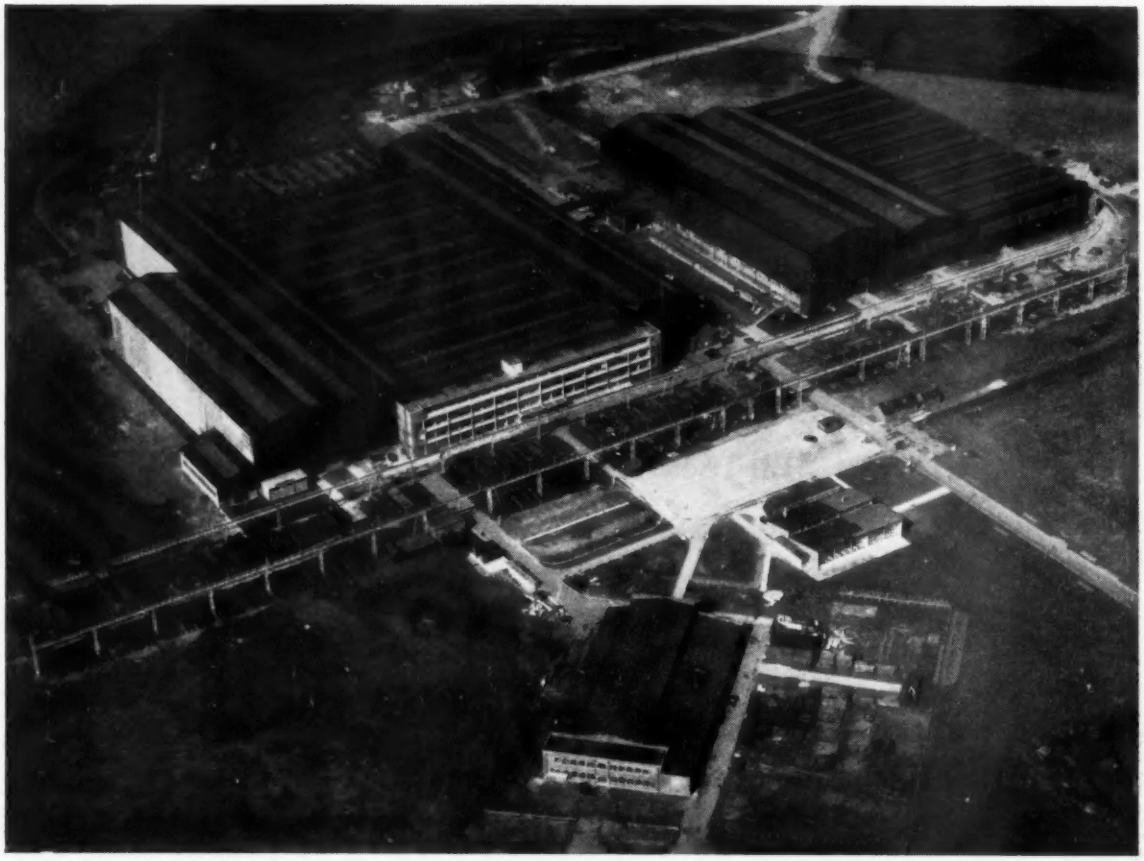
Mr. John Cawood, Board Press Officer, told the 'GAS JOURNAL' that the American line wrapping technique is being used, believed to be only the second scheme of its kind in Britain. Thrust bore methods will be used when the pipe-line crosses railway lines.

At the most difficult crossing, the Fossedyke, because of the nature of the river bed it is impossible to thrust bore, so a 200 ft. span bridge will be built to carry the pipe-line across.

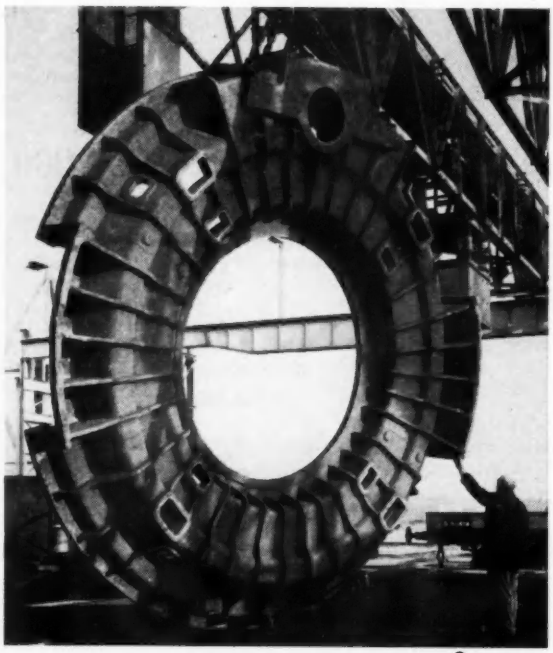
Branch mains will lead off the pipe-line to serve gas users in Gainsborough, Misterton and Epworth and Retford. Altogether, the new project will serve about 70,000 gas consumers in factories, offices and homes.

Handicapped persons' cooker deliveries

The much-discussed gas cooker which has been specially designed for use by physically handicapped people, is now beginning to come into commercial production. The initial deliveries are being used by area boards for extended trials and demonstration to their staffs. It will not be available to the public until a later date, when a further announcement will be made, says the Gas Council.



I.G.E. SECTION SEE NEW POWER-GAS WORKS



A gas generator skid base cast in meehanite and produced in one piece by the CO_2 moulding process.

THE North of England Section I.G.E. held an interest-packed general meeting last Thursday when they were the guests of the Power-Gas Group at Stockton-on-Tees.

First in the three-hour proceedings was a tour of the new South Works, a progressive re-building of the Parkfield Works used by Ashmore, Benson, Pease & Co. Ltd. (a member company) for over 80 years.

Then Dr. G. Milner of P.G. Engineering, Ltd., summarised a comprehensive paper he had written for the occasion on 'Developments in Town Gas Production.' This paper, together with the short discussion which followed, will be dealt with in a later issue.

The South Works has been built on the basis that each production plant should be provided with twice the floor area it had in the old works—and with room for redoubling later. Similarly, room was to be allowed for the quadrupling of office accommodation. Flexibility was to be the keynote.

A site of 135 acres was secured half-a-mile south of Parkfield Works. The new constructional shop first came into production in 1951, and now occupies a total floor area of 200,000 sq. ft. The adjoining structural bay has added 27,200 sq. ft. and much improved facilities.

In June this year the machine and fitting shops were completed under one roof.

About £3 mill. has so far been spent on the new works, although only a small proportion of the site has yet been used.

NATIONALISATION FOR A DECADE —II

Not Nearly Enough Information About Falling Domestic Consumption, Complains R. KELF-COHEN, C.B.

IN my last article, published in the 'GAS JOURNAL' of October 21, I touched on various aspects of the industry's activities over the period 1950-59, and pointed out the considerable diversity in the experiences of the 12 boards. Here I propose to examine the results of nine years' working in relation to the three main types of consumer—domestic, industrial and commercial.

The domestic consumer has long been regarded as the basis of the gas industry and in 1950 took over 50% of the output except in two areas—the East and West Midlands. In both those areas industrial consumption of gas is, of course, exceptionally heavy.

During and after the war, largely because of restrictions on solid fuel, the domestic consumer increasingly resorted to fuels which could not be rationed—gas and electricity. Gas sold rose from 1,500 mill. therms in 1938 to 1,773 mill. in 1945, and the cessation of hostilities and repairs to blitzed areas, particularly in London, increased gas sales to 2,119 mill. therms in 1948. This increase was largely domestic.

By 1950-51 sales had reached 2,400 mill. therms, of which 1,391 mill. (almost 58%) were to domestic consumers. In 1958-59 the corresponding figures were a total of 2,605 million therms of which 1,308 (50%) went to the domestic consumer. But in the same period the numbers of these consumers increased by nearly 900,000, from 11.2 to 13.1 mill. Clearly there has been a substantial decrease in the amount of gas bought by each domestic consumer. How have the 12 boards fared in this very important change for the worse?

Table I shows the changes in the amount sold by each board for domestic consumption—comparing the years 1950-51 and 1958-59. Figures for the year 1954-55—which is half-way through the period—have been inserted in order to see whether the decrease operated evenly over the whole period.

TABLE 1
SALES OF GAS PER DOMESTIC CONSUMER

Board	1950–51 No. of Therms	1954–55 No. of Therms	1958–59 No. of Therms
Scottish	120	110	97½
Northern	129	120½	114
North-West	113	106	97½
North-East	100½	91	86½
East Mid.	112	103	99½
West Mid.	133	124	114
Wales	102	98	96½
Eastern	124	116	106
North Thames.. ..	133	129	118
South-East	133	126	119
Southern	151	135	123
South-West	134	123	115

These figures prove that none of the boards has been able to escape the general tendency of the domestic consumer to take less gas. To some of the boards, the decline is very heavy and serious because of the great importance of the domestic load—e.g. Scotland, Southern and South Western. It is rather remarkable that in the Southern area the domestic consumer in 1950 should have bought 50% more gas than in Yorkshire or in Wales. There were heavy space heating loads in holiday resorts such as Bournemouth, but they would hardly be enough to account for the exceptionally high figure in the Southern area. Incidentally Wales has the lowest percentage decline in sales per domestic consumer over the whole period. The largest percentage decline was in Scotland, the second being in the Southern area.

This steady decline in domestic consumption is the dominating factor in the activities of all the gas boards, but one would hardly think so from reading their annual reports. These reports are sent to the Minister of Power for presentation to Parliament. This year the reports contained valuable reviews of the ten years from vesting date. Ministers and Members of Parliament are surely entitled to find in those reviews a detailed discussion of this dominating factor with an explanation of its causes and a description of the steps which the boards are taking to deal with it.

Production Problems

Some of the boards have produced excellent reviews of the first ten years; some have hardly written anything. But in none of the reviews does this topic receive the full treatment to which it is entitled. The reviews justifiably make much of the difficulties of the boards when they took over and of the work of reorganisation and integration. But they are too dominated by the production problems of the industry. The justification of all the work of re-organisation was to provide the nation—which is now the owner of the industry—with an efficient and satisfactory supply of fuel in the form of gas. But if the householder, who provides over 12 mill. consumers, is taking less and less gas, is there not something seriously amiss? And if so what is it?

The boards must have ample information on this subject and it is tantalising that it is not provided in the ten years' review. North Thames, for instance, refers to the market research organisation, which they inherited from the Gas Light and Coke Company. We are told that 'this organisation was extended . . . and throughout the ten years has continued to maintain and renew the basic body of information regarding domestic consumers' use of gas and to issue reports on

the commercial and technical aspects of the market' (paragraph 63). But these reports go only to the Board and in part to the manufacturers of appliances! Should they not have been summarised for the benefit of the shareholders in the North Thames Board, whose representative is the Minister of Power?

Some of the reports contain useful information on the changes in domestic habits which have led to declining consumption of gas. West Midlands has a valuable paragraph (68) and similarly North Western (18); Southern also deal with the matter in various paragraphs (49, 50 and 145). But there are some boards which hardly refer to the matter or at the most mention warmer weather and industrial recessions, as the causes of falling sales.

The problem, in all conscience, is difficult enough but it can hardly be understood by the interested public if the facts available to the boards are not made known. At present the industry tends to minimise the problem. After all the number of domestic consumers is rising and to some extent off-setting the reduction in demand. Further, can we not assume that more and more gas will be sold to industrial and commercial consumers, in the expectation that these will make good any decline in sales to domestic consumers?

Great Variations

Industrial sales have indeed been the bright side of the first few years' development. As pointed out in the previous article, the numbers of industrial consumers have been steadily falling, but despite this industrial consumption has been rising. In 1950-51 the average off-take of the industrial consumer throughout the country was 5,600 therms per annum, but in 1958-59 the figure had risen to 8,300 therms. This, of course, concealed great variations between the boards from over 20,000 therms in the East Midlands, with its great steel consumers, down to the multifarious small industrialists in North Thames whose average consumption was about 3,000 therms.

Similarly the commercial load in its more modest way has contributed to offset the failure of the domestic load. Both in industrial and commercial sales all boards have shown increases. The percentage increases in the sales of gas to commercial consumers have been as high as 60% in Scotland and 53% in the East Midlands, though several boards show much smaller increases, and one hardly any at all. In 1950-52 sales of industrial and commercial gas at 964 mill. therms represented about 40% of the total sales of gas. In 1958-59, at 1,169 mill. therms, they represented 48% of the increased sales. With the continuation of present tendencies and with the boom in industry, it is probable that this year will see the sales of industrial and commercial gas exceed for the first time 50% of total sales.

Some of the boards are pinning their hopes on the expansion of the domestic space heating load and speak as if the old basic cooking load is bound to keep on shrinking. Their difficulty is the time factor. To expand the space heating load appreciably gas must be cheaper; experiments are being tried with various kinds of tariffs and it is to be hoped that the reports for 1959-60 will give some indications of the effects of those tariffs.

The gas industry is justifiably proud of its variety of technological developments in gas production. But these, even if successful in lowering the cost of gas, for several years to come, will produce but a small part of the output; and they have not yet been shown to be sufficiently economic to justify adoption. At present the industry has almost 25% more manufacturing capacity than ten years ago. The plant, in any case, is in much better shape than it was ten years ago—much of it being new; the old plant has largely gone with the 600 manufacturing stations closed down since vesting day. Similarly, the distribution system has been overhauled and substantial additions made; the 74,400 miles of main on vesting day had grown to 93,800 miles by March, 1959. The industry is now in good trim to carry its present load and quite a substantial addition thereto.

It looks, therefore, as if the next few years should be a period of consolidation in capital development, while the technological developments are being proved out and assessed from the economic standpoint. At present, capital charges are heavy and substantial increases in sales of gas are required to make them more tolerable, especially in view of the unfortunate decline in the revenue from sales of products. Presumably the boards, in planning further capital expenditure, will be satisfied that the assets obtained from such expenditure will yield an adequate margin of profit, which will enable them to carry the additional capital liability. Without such assurance the most attractive technical improvement has no justification in the present state of the industry.

GAS IN AUSTRALIA

1958 Results Show Continued Upward Trend

THE 1958 statistics of the Australian gas industry continued the upward trend of the last decade. Gas issued by all utilities rose to 244,165,000 therms, an increase of 2.0% over 1957 and an increase of 17% in the last five years.

In the capital city areas, gas made from black coal declined from 123,757,000 therms in 1957 to 115,214,000 therms in 1958, while gas from c.w.g. plants rose from 32,792,000 therms to 38,653,000 and that from brown coal gasification plant in Victoria rose from 14,973,000. therms to 19,727,000. Gas purchased from oil refineries rose from 38,848,000 therms in 1957 to 41,318,000 in 1958.

Change in Classification

Gas sales increased by 2.5% over the previous year and the number of consumers (meters in commission) rose by 1.7%; consumption per meter in 1958 was 171 therms in the capital cities and 133 therms in other areas, as against 163 and 132 respectively in 1955. Total domestic sales of gas fell from 155,525,000 therms in 1957 to 154,265,000 in 1958, but this fall is stated to be due to a change in classification. Coke and breeze sold rose from 123,411 to 127,884 tons.

From a paper to the Midland Junior Gas Association.

Experiences in the United States of America

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THE paper covers the experiences of the author during a visit to the United States of America as a recipient of one of the Woodall-Duckham Educational Awards offered by the Institution of Gas Engineers.

It was intended that the two successful candidates should each attend two three week courses at the Institute of Gas Technology, Chicago. The money allocated to each person was £500, and it was felt that it would be possible, in addition to the courses, to arrange for a further stay of approximately two weeks, to enable visits to be made to American gas companies. My colleague and I were indeed fortunate in having this period extended by a further two and a half weeks by courtesy of our respective area boards. In all we were away from this country for a period of 14 weeks.

Most of the visits following the completion of the courses in Chicago, each of which lasted about three and a half weeks, were made independent of my colleague, who was carrying out a different line of investigation.

The courses at the Institute of Gas Technology which I attended, namely 'Natural Gas Distribution' and 'Natural Gas Production and Processing,' were of extremely good value. A large proportion of the material covered was theoretical and the subject was developed from first principles.

Fundamental Instruction

At the Institute of Gas Technology the undergraduate programme is the object of current emphasis because of the great need by the industry for men trained at this level and because it represents the best source of qualified graduate students. Impetus was also provided by the fact that nearly every engineering school teaches a power option in electrical engineering, but few schools teach anything allied to gas engineering. The instruction at I.G.T. acquaints the student with the fundamentals on which the gas industry rests.

An important objective of the undergraduate programme is, therefore, to give a group of well-qualified students an introduction to each major phase of the industry's operations. If the student is attracted to the industry, he will have a foundation upon which to build a successful career.

It is emphasised that, although the curriculum appears to be specialised, fundamental science rather than operating technology is stressed, in keeping with current education philosophy.

The direct training in the undergraduate programme is carried out through a gas technology option in either chemical or mechanical engineering. The actual instruction consists, in addition to the usual engineering studies, of course work presented during the junior and senior years under the general titles of natural gas production and processing. The subjects covered are natural gas production and processing, transmission, distribution and fuel utilisation.

Undergraduate Programme

Opportunities in the American gas industry are not generally appreciated by students in colleges and universities. Therefore, to capture the interest of young engineers in the industry and its operations, I.G.T. has sponsored an undergraduate scholarship programme in the gas technology option.

For the past three years, full tuition junior-senior scholarships have been granted to qualified men at the Illinois Technical campus, who could maintain the required academic standards, work in the gas industry during the summer between their junior and senior years, and give the gas industry fair consideration in seeking permanent employment.

The object of the graduate programme is to train men for positions in research and development education and possibly for positions in long range technical planning and to carry out basic research for the industry. I.G.T. is an affiliated department of the Graduate School of Illinois Institute of Technology and gives work leading to the degrees of Master of Science in gas engineering, Master of Gas Technology and Doctor of Philosophy. The programmes normally require one, two and three further years to complete respectively.

For the Master of Science degree, candidates divide their time approximately as follows: 40% on graduate gas technology courses, 10% on mathematics beyond differential equations, 10% on advanced thermodynamics, 25% on research and thesis, and the remainder choose advanced engineering and mathematics subjects

The Master of Gas Technology programme is approximately the same for the first year as the Master of Science programme; the second year is essentially devoted to training in business management.

The curriculum for the Doctor of Philosophy requires

study distribution approximately as follows: gas technology 25%; research 33%; mathematics 15%; advanced science and engineering subjects 15%; and the remainder as electives.

Each technical summer course is intended to provide integrated coverage of a major phase of the industry, and to co-ordinate theory with practice. Fundamentals are reviewed by study of the derivation of basic equations and the formulæ currently used in the operation under discussion, to ensure that the engineer understands and accepts the limitations imposed by the short cuts employed in commercial practice. The exchange of practical experience between course students is encouraged to supplement class room instruction.

Each course consists of a series of lectures, discussions, quizzes, and calculation and study periods. The subject material discussed during the lectures has been developed into a most comprehensive series of notes and bound in three-ring binders.

The visits made between the courses and afterwards provided interesting illustrations of the work going on in the American gas industry. A short visit to the Gas Machinery Company at Cleveland was made before the first course started. The Company's activities were practically all concerned with the manufacture of industrial furnaces or the repair of existing gas-making plant.

The only new gas-making plant that had been installed in recent years was a modified Hall two-shell regenerative oil gas plant for the City of Duluth. A bed of catalyst was included in each vessel to effect reforming of liquid hydrocarbons. The City of Duluth, Minnesota, had for some time purchased its entire gas requirements from a local pig iron producer who operated coke ovens, primarily to produce metallurgical coke. The city's gas requirements had increased at such a rate that they outstripped the coke requirements of the pig iron producer. For obvious economic reasons the pig iron producer was forced to restrict the daily supply of gas and in view of the possibility of there being natural gas in the area in the not too distant future, gas-making plant should be installed so that the sale of gas for ever increasing space heating customers could be maintained. A number of different types of equipment capable of producing gas of 530 B.t.u. per cu.ft. and a specific gravity of .45 were considered, and the regenerative catalytic reforming process was chosen, by which a variety of l.p. gas feed stocks as well as petrol and kerosene are catalytically reformed.

Estimated Cost

The manufacturing process itself consists of two half cycles, each of which is a complete gas-making operation. The process is regenerative and reversible. The capacity of the plant is rated at 7.5 mill. cu.ft. per day of 530 B.t.u. gas, but this includes the admission of cold enrichment propane at the rate of 1.9 gal. per 1,000 cu.ft. of gas made to the reformed gas of a c.v. of 340 B.t.u. The estimated cost of producing the 530 B.t.u. gas is about 73.5 cents per 1,000 cu.ft., or about 12.02d. per therm.

The possibility of natural gas supplies to the Duluth area was considered when purchasing this plant because of its ready adaptability to produce gas of 1,000 B.t.u. per cu.ft. as a conventional Hall plant. A scheme was therefore prepared to utilise the l.p. gas equipment to manufacture propane-air gas. A total of 15 mill. cu.ft. of substitute or supplementary 1,000 B.t.u. gas comprising equal volumes of oil and propane-air gases could under this scheme be made available.

At station B of the Philadelphia gasworks, gas is manufactured or processed and distributed at a calorific value of 720 B.t.u. per cu.ft. Station B was capable of supplying a total of 250 mill. cu.ft. per day which comprised the following gases: (1) oil gas, (2) carburetted water gas; (3) catalytically cracked natural gas and kerosene, (4) propane/air mixture, and (5) natural gas/air mixture.

The calorific value of the town gas was gradually being increased to allow for further supplies of natural gas to be used.

The cyclic catalytic reforming plant consisted of two 10-ft. i.d. reactor chamber plants with a combined capacity of 25 mill. cu.ft. per day of reformed gas at a calorific value of 220 B.t.u. per cu.ft. and specific gravity of .63. The catalyst bed was stated to have a life of approximately 25,000 working hours. It was common practice in periods of high demand to use kerosene as the process and heating hydrocarbon source. The liquefied petroleum plant was designed for peak shaving on the coldest days and for use in the event of a failure in the supply of natural gas.

Compressing Equipment

Steam at the works was provided by oil or natural gas fired water tube boilers operating at 360 p.s.i. or 150 p.s.i., and a low pressure pass-out system was in operation at 25 p.s.i. Gas compressing equipment of the rotary and reciprocating type was driven by either natural gas engines, steam or electricity. The maximum operating pressure of the compressors was of the order of 50 p.s.i.

The first day of the visit to the Baltimore Gas & Electric Company was taken up investigating accountancy and billing procedures which were centred around an I.B.M. 650 electronic calculator. Items of general interest in the distribution section were discussed and field visits made.

The Baltimore Company was one of the more conservative companies visited, and it was apparent that little development work of an experimental nature was taking place. The gas distribution system comprised low, intermediate, and high pressure mains at 5 in. w.g., 10 p.s.i., and up to 200 p.s.i. respectively. The majority of the l.p. system was old cast iron main, and in many cases the pressure in these mains had been increased to those of the intermediate range. All new intermediate and high pressure mains were coated and wrapped steel. The terminals of a new 14-mile 24-in. transmission main were inspected but unfortunately pipe-line operations had finished three days previously.

A visit was made to a small city gate station to inspect a parallel orifice meter installation for dealing with wide demand fluctuations. The rate of intake through the station ranged from .75 to 10 mill. cu.ft. of natural gas each day. Pressure was reduced from 350 to 150 p.s.i. in two stages, one before and one after the orifice meter installation. The orifice plates were arranged on parallel mains with a gas pressure operated control valve on one

main. A Foxboro control was arranged on the other main and set to open the control valve when the differential pressure across the working orifice plate reached 80 in. w.g. The control valve was adjusted to close when the differential pressure fell to 10 in. w.g.

The orifice meter arrangement described was the property of the supplying company, and a further check orifice meter was in use by the Baltimore Gas Company. The orifice plate of this installation was so constructed that it could be changed without interruption to the gas supply. A 2-in. flanged orifice plate assembly of this type costs approximately £85 and a 24-in., £1,300. All orifice plates are examined monthly for damage or dirt and are changed four times a year. Oil fogging was practised at this station at a rate of ½ gal. fog per mill. cu.ft. gas. Odorant was added at a rate of ¼ lb. per mill. cu.ft. of gas.

Four Projects

There were some interesting projects being investigated at the Institute of Gas Technology's Crawford Research Station. Among these were:

1. The production of natural gas supplements by cyclic-regenerative cracking of petroleum oils, carried out in the I.G.T. 'four shell' cyclic-regenerative pilot unit comprising twin generators and twin regenerators. The unit has been in operation several years and frequently modified in the light of new findings. The products are quenched as they leave the cracking zones and leave the plant from offtakes located on the side of the tar pots. Only gases and vapours—air, flue gas, steam and process hydrogen—are passed through the regenerator, thus keeping it comparatively clean. Because of reduced smoke formation, no air purge after the make period is required, permitting production of lower specific gravity make gases. Highly preheated process hydrogen is used as a carrier gas converting larger percentages of make oil to fuel gas with a corresponding reduction in tar and coke formation. The 1957 tests showed that a hydrogen rich carrier gas can be produced as part of the process, thus substantially eliminating the need for additional facilities to produce processed hydrogen. However, considerable catalyst problems were encountered, indicating further catalyst development work. The operating results have shown that integral cyclic hydrogen production requires no more than the fuel requirements necessary to produce the same quantity of hydrogen in conventional reforming operations.

2. The production of pipe-line gas from low rank coals by hydrogenation in a pilot plant operating on preheated coals termed 'chars' which were non-agglutinating. The 'char' is pretreated to pass a −60 mesh and is subjected to a temperature of 500°F. in a pressurised hopper. The 'char' is then fed by a screw feed from the hopper into the reactor where it meets preheated hydrogen entering through a porous steel disc. The hydrogenation of the 'char' was undertaken at a pressure of 300 lb. per sq. in. in a 2-in. diameter high temperature alloy tube reactor. The hydrogen fluidises the coal and reacts with it in a bed at a temperature of 1,350 to 1,500°F. The height of the bed is maintained by means of an adjustable stand pipe. The unreacted coal and hydrogen and product gas flow down through the stand pipe into a pressure receiver which separates the solids, allowing the gas to go overhead into a filter and condenser. The unit was working on a charge of 4 to 5 lb. of 'char' per hour, using 15 cu.ft. of hydrogen per lb. of fuel. The unit capacity was stated to be 10 lb. of fuel per hour.

3. A coal gasifier: To study the production of high B.t.u. gas from coal, the Institute has a pilot plant gasifying coal in suspension with oxygen and steam at pressures of up to 75 p.s.i.g. The reactor has an internal diameter of 18 in. and an internal length of 6 ft. Coal can be fed at the rate of up to 1,500 lb. per hour by means of screw feeders and a lock hopper. The coal is transported into the reaction zone by preheated steam through a nozzle which assists in further size reduction. Oxygen enters at the top of the reactor and the products of gasification flow down through a slag pot to a steam preheater. The product gas is then quenched with water and reduced in pressure. The unit is capable of producing between 20,000 and 50,000 cu.ft. per hour of synthesis gas. Facilities are available for removing 200 grains of sulphur per 100 cu.ft. from this quantity of synthesis gas prior to its storage in a low-pressure water-sealed holder. Facilities are available for adjusting the hydrogen:carbon monoxide ratio in this mixture by a water gas shift reactor with a capacity of 5,000 cu.ft. Organic sulphur can be removed from this quantity of gas by an activated charcoal absorber.

4. An investigation into the removal of odour bearing materials from natural gas by soil constituents, has been initiated to determine the rate and extent of removal of representative odorant compounds from natural gas at various flow conditions by selected soil constituents of controlled moisture content. Gas companies in various parts of America are concerned with the problem of ensuring retention of detectible odour in gas which passes through soil after escaping from a pipe. Complete removal of the odorant from the gas has been observed in some instances.

House-heating Waiting List

The Northern Illinois Gas Co., which the author visited, has a territory of 10,000 sq. miles with an estimated population of 2 mill. Gas supplies are obtained from the following companies—(1) the Natural Gas Pipeline Company of America, (2) the Texas Illinois Natural Gas Pipeline Company, (3) the Chicago District Pipeline Company, and (4) the Natural Gas Storage Company of Illinois (Herscher).

The maximum daily output in 1958 was 510 mill. cu.ft., with house-heating customers representing 43% of the Company's total residential customers. The number of house heating customers has risen from 48,000 in 1948 to 250,000 in 1957, and the house-heating waiting list on December 31, 1957, stood at 110,567; it is likely to remain at that high figure unless the Federal Power Commission sanction a £60 mill. pipeline to be built into the Illinois area. The average annual consumption per residential customer is 1,000 therms. This includes those customers without house heating, the average for whom is 300 therms per year.

The Company's operating department, located at the headquarters at Bellwood, handled all major distribution planning and development for the Company. There was a staff of 30 draughtsmen and 30 engineers in the engineering section and 14 engineers or draughtsmen in

the development section. Comprehensive mains records were kept, index maps 2½ in. to the mile made up in sections 6 miles sq. and individual mains records were 1 in. to 200 ft. An average of 600 miles of new or revised mains were being laid per annum by direct and contract labour. Pressures in the distribution system were; low pressure 6 in. w.g., intermediate 5 to 10 p.s.i., high pressure 12 to 20 p.s.i., belt areas 60 p.s.i., and inner stations 150 p.s.i.

The main gas dispatcher's office at the Bellwood headquarters is under the control of the Chief Dispatcher. On each shift there are two dispatchers and one clerk on duty. The clerk collects incoming figures and prepares a summary. Dispatcher A correlates weather information and forecasts sales; these forecasts may be altered four times in a day. He also handles the curtailment of interruptable supplies through divisional offices as this is necessary. Dispatcher B attends to 'dispatching' on the information he is given and carries out any special duties that are given to him by the Chief Dispatcher. It is arranged for the 'tap station men' to visit the dispatch room at regular intervals for familiarisation, as appointments to dispatcher are made from this source.

Corrosion Section

A section was started in 1946 to handle matters connected with corrosion problems. The staff consists of one senior engineer and seven other engineers or trainees, together with a field crew of four men. Approximately 15 mill. out of 37 mill. ft. of pipe are already cathodically protected. In addition 1½ mill. ft. of pipe in rural areas are protected by 110 rectifier installations. All steel pipe is coated and wrapped using coal tar enamel, glass reinforcement and paper covering. It has been found that sacrificial anodes in general require replacing after 15 years. Three standard weight magnesium anodes are used, 1-lb., 7-lb. and 32-lb. The 1-lb. anodes are used on all services off C.I. mains, insulation being arranged at the main and meter. The backfill used around the anode consists of 75% gypsum, 20% bentonite, and 5% sodium sulphate. Since 1946, 45,000 magnesium anodes have been installed and provision made for 29,000 test points.

A construction section is responsible for planning and maintenance associated with buildings and stations. The section is controlled by a senior engineer and a staff of ten. A new operating headquarters had recently been built in the Northern Division with a floor area of 20,000 sq. ft. at a cost of £200,000. All gas holder painting is put out to contract. It was noticed that sand blasting is specified for most cleaning down operations on any structural steelwork.

In cases of leakage on new mains, Freon is used to assist in the location of the leakage before the main is filled with gas. A leak detector made by the General Electric Company is used to detect the presence of halogen vapours. The instrument operates by sucking a small sample of the air into a vapour sensitive element of the diode type. The sensitive element and blower are assembled in a hand-held detector unit which is at the end of an electric cable. The Northern Illinois Company has had great success with this form of leak detector resulting in savings in time and money.

Underground Storage Pools in the U.S.A.—The seasonal variations in demand for gas is a significant factor to both producers and transporters, as well as to distributors. In general, pipe-line load factors are kept as close to 100% as possible, due to the tremendous investment in facilities. Distributors buy from pipe-line companies at a fixed daily rate, if possible, regardless of the season, since the price penalty must otherwise be met. A yearly charge based on the maximum demand and known as the demand charge is made by pipe-line companies. To this is added the commodity charge or cost for gas actually taken from the pipe-line. Further, there is an obligation to pay for a minimum contract quantity. This procedure is designed to keep the pipe-line load factor high and to avoid the loss that would result if the load factor were reduced.

'Dumping' Out of Favour

Some companies can store significant quantities of gas in partially depleted reservoirs during the warm weather, and draw on this supply during peak periods. Such fortunate companies need not be penalised by the demand and commodity charge type of price structure. Other companies lacking enormous storage sell the summer excess to industrial customers, invariably power stations, on an interruptable basis. It is significant, however, that the Federal Power Commission does not favourably regard 'dumping' or 'low grade uses,' when granting certificates, so a relatively light summer load on the pipe-lines may be difficult to avoid.

With the ever increasing highly seasonal house-heating load, vast sums of money are being invested in investigations of possible storage fields. It should be emphasised that success in this type of activity is always highly uncertain, and in many cases of apparent promise, development of a field has proved impracticable only after large sums of money have been spent.

The story of the Herscher Dome which is particularly interesting, began in the post-war period, when increasing demand for house heating began intensifying the peak-load problems of the Chicago and northern Illinois supply areas.

The existence of a structure of considerable extent near the small town of Herscher, Illinois, had been known for many years. At the turn of the century some 18 shallow oil wells were drilled with cable tools to a depth of 200 ft. Oil with a small volume of gas was encountered; however, the accumulation was not of commercial importance, and after a short period of pumping, the oil wells were abandoned.

Detailed Area Study

The Herscher structure, as shown by subsequent drilling, is an elongated, north-south trending, asymmetrical, double-plunging anticline, of an area of some 8,000 acres with a structural closure of 200 ft. The proximity of this structure to company pipe-lines, facilities and market, in addition to the satisfactory estimate of gas storage volume that could be stored in the Galesville sandstone aquafer, brought about a detailed study of the area. Some 104 shallow test holes were rotary drilled to the top of the Galena formation, a readily recognisable marker encountered from 150 ft. to 350 ft. in depth from the surface. These structure tests were located on the inter-section of section lines and covered

an area of roughly 11 miles in a north-south direction and 7 miles in width.

The surface position of the top of the Galena at each each point was calculated and indicated on a base map. By contouring these points, the structure at the top of the Galena was obtained. This map then indicated the size and shape of the structure, its trends and amount of dip or slope from the highest point outwards in all directions. Four deep tests were then located to afford more subsurface control. These tests were drilled and cored through the Galesville sandstone aquafer which was to become the gas storage reservoir. The cores provided the necessary information concerning the porosity and permeability of the reservoir and the adequacy of the cap rock immediately overlying the reservoir.

A total of 21 injection-withdrawal wells were completed in the 100-ft. thick Galesville sandstone on the crest of the structure at 660-ft. spacing. Thirteen observation wells were drilled on the structure to the top of the reservoir at down-dip positions on the flanks to observe water levels and follow the movement and effect of the gas bubble that was to be created. Gas injection was started on April 1, 1953, using two 150 h.p. compressors with a total capacity of 15 mill. cu. ft. per day. The main plant was put into service on July 1, 1953, and injection rates were increased to 200 mill. cu. ft. per day.

Wells Became Active

During the last week of July 1953, after gas had been injected for four months and the gas bubble in storage was under all injection-withdrawal wells at a thickness relative to their structural positions, one of the shallow water wells in the town of Herscher began to bubble gas. During the following week a total of 33 village water wells, normally bottomed at around 100 ft., became active with gas. At the same time the only oil well that was open to the surface also became active, and the volume escaping from this well gradually increased to an estimated volume of 1.5 mill. cu. ft. per day. Gas injection into the reservoir was stopped, the old wells were all located and cleaned out, and if in a safe position allowed to vent. It was apparent that the Galena formation had in some manner been pressurised with injected gas and if enough adequate vents could be drilled, the activity of leakage gas in town could be materially decreased, perhaps even stopped. A Galena well was drilled and cased adjacent to each injection and withdrawal well and allowed to vent to atmosphere.

In January 1955, a pilot gathering scheme was connected to the 10 Galena wells, because as vents these wells had effectively prevented pressure build up in the Galena. At the present time 15 mill. cu. ft. of Galena gas is being collected and re-cycled to the Galesville. The Galena gas is termed 'sour' because it contains approximately 250 grains of H_2S per 100 cu. ft. which is removed in a desulphurisation plant by aqueous amine solutions.

The contamination of the town's water supply committed the Natural Gas Storage Company to provide a new water system from new boreholes complete with an overhead storage tank. In addition, it has been necessary to lay in some cases replacement irrigation water supply lines.

Several theories were advanced as possible explanation for leakage from the reservoir at 1,750 ft. into the 150-ft. level. They may be summarized as follows:

1. Faulty well cementing. The cement could have channelled between the casing and the borehole providing several small avenues of escape at one or more locations.

2. Lack of adequate cap-rock. The hard dense dolomite immediately overlying the sandstone reservoir could be porous in some areas, and permit the upward migration of storage gas.

3. Faulting. The upwarping of the strata necessary to produce such a structure could possibly have exceeded the elastic limit of the overlying formations and caused fracture or faulting.

4. Old wells. Approximately 20 old oil wells have been located. There was a possibility that one or more deep tests could have been drilled to the deeper horizons; possibly the gas storage reservoir.

Early in 1956, attention was directed towards providing a means of operating the reservoir at a maximum limit with safety. Water is now being removed from the periphery of the gas bubble to facilitate the injection of gas with a minimum of pressure increase. The water withdrawn from the Galesville reservoir is injected into the Trempealeau formation, which is approximately 300 ft. thick and roughly 350 ft. above. Five water withdrawal wells are now working with an extraction rate of 165,000 gal. per hour. The results of the water withdrawal programme appear favourable but the Natural Gas Storage Company are not prepared to predict with certainty the benefit to be obtained from this programme.

Each of the Galesville water withdrawal wells were drilled initially to Mt. Simon strata depth to provide engineering and geological information to determine the feasibility of deeper storage at Hershcer.

The Cincinnati Gas and Electricity Company, in association with the Texas Eastern Transmission Corporation, are developing two underground propane storage caverns. The caverns will each have a capacity of 150,000 barrels, and it is intended that one will become the property of the C. G. & E. Company. The T.E.T. Corporation will use their cavern to house interface material where it can be fractionated later and the products recovered by them.

Pipes Converted

During World War II, two pipe-lines were laid from Texas to the Eastern States to speed up deliveries of essential fuel oils, they are known as the Big and Littlebig Inch pipe-lines. At a later date they were both converted to gas transmission mains, but early this year the Littlebig Inch was re-converted to carrying various petroleum products. Shipments of the petroleum products is at the rate of 50,000-75,000 barrel batches with approximately 10,000 barrels of interface material.

The C. G. & E. Company have contracted initially for 125,000 barrels of propane annually with a possible increase of 50,000 barrels in an extremely cold winter. A barrel is equivalent to 42 U.S. gal. measured at 60°F. or 34.97 imp. gal.

A 12-in. diameter hole approximately 375 ft. deep is rotary drilled and careful study made of the cores. Once the shale structure has been reached and its ade-

quacy confirmed, the initial hole is enlarged to 54 in. diameter. Mining of the shale structure then takes place to form the caverns which have a cross section 20 ft. high by 30 ft. wide. When the mining operation is complete, the delivery/suction pipes will be installed and the top sealed.

On the surface, the propane/air plant consists of air compressors, vaporiser and mixing equipment together with steam raising plant. The vaporising equipment is designed to deal with 50 mill. cu.ft. per day of releasable propane giving approximately 70 mill. cu.ft. per day of propane/air mixture. Previous experience has indicated that ½ to 1% of the total volume of propane loaded into the mine will be lost as leakage. The propane is stored at a pressure of about 100 p.s.i. and a temperature of 50°F. The effective capacity of releasable propane/air mixture is approximately 315 mill. cu.ft. The estimated cost for the underground storage cavern is $647,000 and $1.118 mill. for all the l.p. equipment, transmission mains, electrical equipment, etc. The total investment is therefore $1,765,480, or £630,000.

Cast Iron Pipe Sealing

There are four methods developed by the Consolidated Edison Company for internally sealing cast iron pipes.

1. *The fueling method* by which the inside of each joint is coated with a band of Thiokol. This is achieved in two stages, namely, cleaning and coating. Each operation is performed by a different machine both of which incorporate a magnetic locating device. This detects joints by locating points of increased magnetic reluctances. The machines are propelled manually through a gas main by means of a ¾-in. quick coupled pipe. Operation of the machine is by compressed air, which is controlled electrically by solenoid valves.

To locate the first joint, the cleaning machine is inserted up to 400 ft. into the pipe and slowly withdrawn until a light flashes on the control panel. This indicates that a joint has been found. The machine is then moved slowly backwards and forwards until a maximum deflection of the instrument pointer is noted. This maximum deflection indicates the centre of the joint. The machine is then withdrawn a predetermined distance bringing the cleaning mechanism onto the joint. Cleaning is achieved by flailing the inside of the joint for a distance of approximately 3 in. on each side of it.

During the cleaning operation, the coating machine is loaded with a compound based on Thiokol liquid polymers and a catalyst, in separate reservoirs. It is inserted into the main, and the most remote joint is located in the same way as in the cleaning operation. At the joint, a locking mechanism braces the machine in the pipe and jets of air are blown onto the joint to remove any loose scale or dust. The Thiokol polysulphide sealant and catalyst are then forced separately into the mixing chamber, mixed and ejected onto the pipe. Rotating paddles spread and force the sealant into the joint space and a 6-in. wide coating, approximately ⅛ in. thick, is applied to the inner circumference of the pipe. Flow of the material is electrically metered enabling the operator to determine how much material is remaining, and to coat each joint uniformly.

Cost studies have indicated that the cost per joint using this method is approximately a third of that using external leak clamps. The major disadvantage is that it is necessary to put the main out of commission for at least one day and to keep it at a pressure of a few in. w.g. for about four days after the application.

A typical example was the sealing of 800 ft. of cast iron 12-in. pipe, on which two cleaning machines and two coating machines were used. After excavating two 18-ft. trenches, the cleaning took two days, sealing four days and curing one day. An additional four days are then required with the main operating at low pressure. Machines are available for treatment of mains from 8 in. to 20 in. in diameter. One machine can be adopted to operate over a range of pipe sizes.

2. *The Never-Leak method* consists of isolating the section of main to be treated and testing for gas tightness. It is then purged of gas and filled with a neoprene dispersion in water. The pressure is then raised to 80 p.s.i. and held for approximately 1½ hours. This forces the water carrying the dispersion through all the leaks and deposits the neoprene and its additives and fillers by a filtration process. The curing process, which produces a pressure tight skin, takes place over a period of two to three weeks, during which time the main must be maintained at a pressure of a few in. w.g. Subsequent tightness tests will indicate the effectiveness of the operation.

It has been found to be possible to treat sections of up to 3,000 ft. in length in one day. It is only recommended for working pressures up to 10 p.s.i. A test section of 280 ft. has been metered for 2½ years and has been found to be gas tight throughout this period.

3. *The spring band method* is only applicable to mains of 30 in. diameter and larger. A layer of Thiokol is applied to the inside of the joint using a spring band. The Thiokol and catalyst are normally mixed at a depot and are conveyed in a refrigerated vehicle to the site.

4. *The injection method.* A solution of neoprene is injected under pressure into the socket at the bell and spigot joint. There have been no experiences of the socket cracking to date.

DISCUSSION

The President, **Mr. G. W. F. Cockayne,** thanking Mr. Dobson for a most interesting paper, enquired whether Mr. Dobson considered that gas technicians in the U.S.A. were in advance of our own. Judging by the slides Mr. Dobson had shown, some of the methods used there, particularly in mainlaying, appeared to be rather crude with the emphasis on speed. He therefore wondered whether Mr. Dobson agreed with this view.

Mr. W. E. Dobson replied that one must remember that the problems in the gas industry in the U.S.A. were very different from those in this country. Their technicians were dealing with a gas containing no sulphur and no moisture. It was true that speed was a feature there, but the thrusting methods used in service laying were made possible by the absence of moisture and could not be undertaken to the same degree in Britain. He added that he felt we could learn a good deal from methods used in the U.S.A. but there was, nevertheless, a tendency to over-mechanisation. Another notable

feature was that breathing apparatus was not normally required since the gas contained no carbon monoxide.

Mr. J. A. Thomas, Stourbridge, asked how appliances at Baltimore were regulated when the gas quality supplied was increased from 500-760 B.t.u. Was it correct to assume from the slides Mr. Dobson had shown that each fitter had his own van, or did one of these vans serve a number of fitters. Apparently bicycles were not used in this type of work as was customary in this country. He wondered how fitters were trained. He noted that the Northern Illinois Gas Company employed five divisional managers and he would be interested to hear how big a division was. In mainlaying, the slides showed that the mainlayers were wearing what appeared to be helmets and he asked whether this was correct and if so, for what purpose. Mr. Tomes finally asked how the joint reading of gas and electric meters in Cincinatti was done, whether there were any joint showrooms and what was the effect on sales generally.

Mr. W. E. Dobson, replying to Mr. Tomes, said that together with Mr. A. R. Bovington, Assistant Distribution Officer, North Thames Gas Board, with whom he had made the trip to the U.S.A., he had spent some time studying the problem of the changeover from gas of very low to gas of very high c.v. This had been done virtually overnight at Baltimore by calling on every available man and by bringing in contractors to assist in resetting and changing orifices, nipples etc. In point of fact the work had continued until well on into the following day. In Philadelphia a similar changeover was made gradually in three of more stages.

Variations in Practice

Regarding the use of what we would call 'service vans', Mr. Dobson said that it was difficult to generalise because of the variations in practice in the many gas companies in the U.S.A. In the Northern Illinois Gas Company, he had on occasions seen one or two fitters attached to each van, but he had insufficient information on this point to be able to say that this was general practice. He added that he saw no details of the training given to fitters, but could say that no man was employed unless he had had a High School education *i.e.* a standard approximately between the Secondary Modern and the Grammar School in this country. After serving with a so-called 'street crew', men were trained as fitters but did not take any examinations comparable with those associated with our City and Guilds Certificates. It was common practice for helmets to be worn by mainlaying gangs as a precaution against the risk of a blow on the head from a back-acter.

As to joint meter reading; he had spent some time with a man engaged on this work. It must be remembered that there were no prepayment meters and consequently the rate of meter reading was high by our standards. As many as 500 meters could be read in a day with an average of approximately 275 per day. There was a high degree of mechanisation in accounting centred around electronic computors. The Philadelphia Gas Company used an electronic computer, and the office personnel on consumer service totalled only 50 for approximately 600 consumers served. The size of a division in Northern Illinois varied but the largest of the five in that Company's area was approximately the size of the Birmingham Division.

Mr. J. Foxton, Cheltenham, said that he was very interested in the specific gravity of the various gases made but felt that what he had heard did not represent the whole problem. Not only was natural gas of high c.v. distributed but so was reformed carburetted water gas etc. The variations in specific gravity of these gases must be great and he therefore wondered what was the effect on gas appliances. He recalled that when at Gloucester, he had experienced problems arising from the distribution of gases of varying c.v. when a good deal of trouble with appliances, particularly overhead heaters, had resulted.

Mr. W. E. Dobson replied that the enrichment he had referred to represented only a small percentage of the total volume of gas distributed. At Philadelphia, changes were made gradually and the effect was under constant observation on a test flame rack. He regretted that time had not permitted him to make a closer investigation of this problem.

Mr. E. Arthur, South Staffs Mond., commented that the reason for the high degree of mechanisation in mainlaying in the U.S.A. was that the soil was easy, the type of machinery used there would suffer severely if used in this country. There was little likelihood of fouling cables when working in virgin soils. He enquired whether the gas was odourless, could leakages be easily detected and was the gas lethal despite the absence of carbon monoxide; if so, what precautions were taken. He found it difficult to believe that breathing apparatus was not in general use and queried whether this was so. He also doubted that although the town of Herscher was located on top of the Herscher Dome there was no leakage of gas.

Mr. W. E. Dobson said that it would be true to say that there were soils in this country as easy as those in the U.S.A. while the latter had soils as difficult as ours to work. It was, however, fair to say that generally in the U.S.A. most of the development work being carried out was in fringe or open country areas, although he had seen great use made of mechanical plant right in the heart of many of the big cities. The back-acter shown on the slide was working in Baltimore in a clay soil very similar to the clays in this country.

Look-out Teams

As to leakage, the practice in the U.S.A. was to employ odorisation which some soils tended to remove. Dr. F. J. Dent, Director of Research at the Gas Council's Midland Research Station at Solihull, was in the U.S.A. while he was there and had been able to offer suggestions in this connection. In residential and rural areas, mobile teams kept a look out for evidence of leakage as shown by dying vegetation and discoloured grass verges, etc. At Herscher, apart from the town, the area over the storage field was agricultural and leakage would have quickly become evident by dying vegetation. In the towns, mobile vans were equipped with tube feelers which were directed along the gutters and any leakage was detected by the infrared apparatus they carried.

He assured Mr. Arthur that breathing apparatus was used, but not to the same extent as in this country. There was a risk of fouling services when thrusting, but from what he had seen and heard, it was more likely to be the gas companies who would suffer when the

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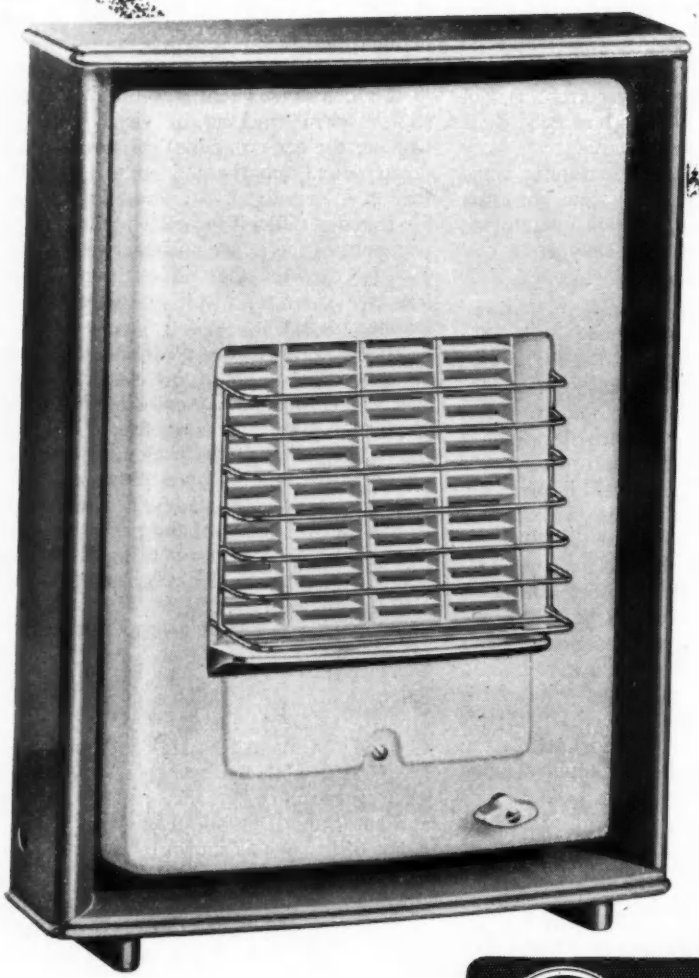

NEW WORLD

PRODUCT OF Radiation Ltd.

leads

telephone companies were engaged in boring for their poles. He also spoke of a very serious explosion which had been caused by a fracture of a gas main in such circumstances.

Mr. L. H. Hardy, Birmingham, referred to the checking of orifice plates and asked whether they were used in the checking of consumers' premises. He was surprised to hear that consumers' supplies could be cut off at an hour's notice, and queried the practice of fitting meters outside premises. Judging by the slides Mr. Dobson had shown, this appeared to be the standard practice, but it seemed undesirable. He asked for his views on the matter.

Mr. W. E. Dobson said that the orifice meters referred to were those used in connection with pipe-line supply points or large consumers, and had to be renewed at regular intervals. The general standard of fitting work was high. As to the 'interruptable consumers,' this type of supply was much cheaper at about 2½d. per therm as compared with about 8½d. per therm for a continuous supply, so that the large consumers were prepared to put up with the inconvenience for financial gain.

Mr. C. R. Kendall, Leicester, asked whether any notice to other authorities was required before mainlaying was undertaken; were the 'district cars' controlled by radio, and has any cathodic protection of mains been carried out.

Mr. W. E. Dobson said that most of the mainlaying he had seen had been in the open country, but there was in existence a co-ordinating committee, the members of which agreed between themselves as to where mains for the various services should be laid. Radio equipment was in general use with all motor vehicles. When travelling in one of the cars he had heard cases of leakages being reported and instructions to attend to them being sent out.

In the U.S.A. they were very conscious of the problem of the corrosion of mains. Each company he had visited had a section devoted to cathodic protection, which was either by means of sacrificial anodes or induced current. In Chicago, the majority of the city mains were cast iron because of the large volume of electrical interference from overhead and subway electric trains. It was general practice to use coal tar enamels rather than bituminous enamels in the pipe wrapping process of steel mains. In Chicago, steel services were estimated to have a life of 33 years while plastic piping was used to make service renewals.

Mr. R. W. Nelson, Birmingham, asked whether Mr. Dobson had any figures showing the number of consumers in the U.S.A. and how the gas load was made up., i.e., domestic and industrial consumers. He asked what was the method of house heating by gas and enquired how spun pipes were treated.

Mr. W. E. Dobson replied that he had no figures to show the breakdown of consumers, but he could say that the North Illinois Gas Company issued a monthly digest showing the average consumption per consumer per annum. In 1957 the figure was 301 therms and for space heating 1,946 therms. The heating of houses by gas was usually done by converting the solid fuel central heating system and in the more modern installations by gas heated air. Spun pipes were treated as in this country.

Caking and Swelling Properties of Coal

OF the revised edition of B.S. 1016, 'The Analysis and Testing of Coal and Coke,' Part 12, 'Caking and Swelling Properties of Coal' is now available and deals with the determination of the crucible swelling number and of the Gray-King coke type of coal.

The method for the determination of the crucible swelling number is essentially unchanged, except that electrical heating is now a permitted alternative to gas heating.

The determination of the Gray-King coke type has not previously been introduced in a British Standard, although the coke type has been used for some time as a parameter for coal classification. In its original form the test was known as 'the Gray-King Carbonisation Assay at 600°C.' when yields of coke, gas, tar and ammonia were determined in addition to the coke type. The determination in its present form, which is now described as the Gray-King coke type, deals only with the assessment of the coke type and is not concerned with quantitative yield.

For coals of high crucible swelling number, the Gray-King coke type was originally determined after dilution of the sample with electrode carbon; it has recently been shown that the latter may be replaced by certain anthracites without affecting the results obtained.

The 22-pp. publication contains six large and fully annotated diagrams. Copies may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 6s. (Postage will be charged extra to non-subscribers.)

Determination of Chlorine

ANOTHER British Standards publication is part 8 in the programme of revising and issuing in separate parts B.S. 1016.

Part 8 deals with the determination of chlorine in the coal sample, previously ground to pass a 72 mesh B.S. sieve, by either the Eschka or the high temperature method. The former method has been slightly modified from the original by reducing the sample weight from 5g to 2g and increasing the incineration temperature from 450°C. to 675°C. These changes reduce operating time from about 24 hours to two hours. The high temperature method—combustion in oxygen at 1,350°C. and determination of the chlorine by titration as hydrochloric acid—has been introduced to enable results to be obtained in an even shorter time.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1. Price 4s. 6d. (Postage will be charged extra to non-subscribers.)

The double and triple Aquastat controls

HONEYWELL'S new range of dual and triple Aquastat controls can, say the makers, halve installation costs for heating controls on boilers and hot water heaters.

Until recently, boilers with high limit/low limit and circulator pump controls had to be fitted with two or three separate thermostats, each of which involved separate tappings in the boiler. The new range of insertion thermostats combine either two or three functions in one instrument.

The dual Aquastat consists of two fast-acting insertion controls, mounted in a single case, with two temperature setting adjustments independent of each other. Two hydraulic-action sensing elements are both housed in a single immersion well. The two direct acting micro switches mounted in the thermostat operate at any value between 100° and 240°F. A typical application would employ the combination controller as a low limit and high limit control, all in one.

The triple Aquastat is similar, but contains one single throw micro switch and one double throw micro switch which enable high limit control to be obtained on one switch and low limit and circulator control on the second switch.

The dual and triple function Aquastat controls will not only save considerably on the cost of installation, but will also provide the boiler house engineer with a small compact control panel for all the limit functions of the boiler. This range of controls can be applied to all types of oil and gas fired boilers. These controls, plus the manufacturers' 'Round' space thermostat and oil burner relay, make up a complete and compact control system.—*Honeywell Controls Ltd., Ruislip Road East, Greenford, Middlesex.*

Trade News

The new Aquastat control from Honeywell Controls Ltd.

A NEW ETHER FLAME TRAP ANCILLARY

A NEW flame-trap ancillary unit, from Ether Ltd., should be welcomed in industries where pre-aerated gas, or premixed gases are used. Under present practice, a flame-trap is provided to arrest the flame temporarily in the event of a blow-back. However, unless it is noticed, the blow-back flame will ultimately burn through the flame-trap.

Now, with the added protection of this new unit, which introduces a detector in front of the element of the flame-trap, gas can be shut off, or an alarm given, within a fraction of a second of a blow-back occurring.

This unit, the Ether flame-trap ancillary unit, Type 350, is small, compact and reasonably priced. It is readily adaptable to all existing flame-traps. Special features include a broken-detector device which puts the unit in a 'fail-safe' condition in the event of a detector element break. A press-button re-set is incorporated to ensure that, after a blow-back has been eliminated, the controlling valve or safety circuit will not re-open until it is re-set manually. A small neon lamp lights up when the unit is in the alarm position.

The unit is suitable for wall or panel mounting and takes a 230 V, single phase supply.—*Ether Ltd., Tyburn Road, Birmingham 24.*

A drip-proof tap

A DRIP-PROOF and reversible drum tap which can be used with virtually any liquids, including paraffin, trichlorethylene, turpentine and others difficult to handle, is now being marketed.

The new tap, which is moulded in Rigidex high-density polyethylene, is extremely tough and is resistant to a very wide range of liquids. It is proof against drip and seepage even with paraffin and thus eliminates losses during storage.—*Phillips Telescopic Taps Ltd., Colliery Road, Birmingham Road, West Bromwich, Staffs.*

NEW SCOTTISH ETCH PRIMER FOR METALS

IN the constant battle to beat rust and corrosion in metals, a new etch primer is now being marketed by Federated Paints Ltd., of Glasgow.

It is a much improved version of the original Strathclyde etching primer, the first one-can, ready-for-use type to be manufactured in this country. This new primer, PA-10, has recently received Admiralty approval for use on non-ferrous metals.

Because of its stability, PA-10 ensures the uninterrupted application essential in automation. It is equally effective applied by brush, or by dipping, and by any of these methods air-dries quickly in 30 minutes. It may be stoved for even quicker drying.

On aluminium sheeting, zinc sprayed metals, shot-blasted steel and on all ferrous as well as non-ferrous metals, it bonds itself to the surface by means of its etching action. Its adhesion on mild steel, or on cadmium plate, is such that it would require over 3,000 lb. p.s.i. to remove it.—*Federated Paints Ltd., Dobbies Loan, Glasgow.*

X-ray testing of welded joints

TO enable the manufacture of all-welded steam boilers to be carried out at its Newark works, Farrar Boilerworks Ltd., has recently put into operation a new X-ray unit for the radiographic inspection of welded joints on test pieces and specimens.

The introduction of this unit is particularly significant in view of the ever-increasing emphasis being placed on all-welded vessels and the gradual disappearance of riveted types, for it means that work on pressure vessels used in the chemical, oil and atomic industries can be successfuly tackled by the company, work which was previously ruled out because of the more exacting Class I specifications.

In operation for over nine months, the new 150 kV Newton Victor X-ray unit with 360° beam tube, has already been of considerable help in maintaining high standards of finished welds. Easily transportable, the complete unit comprises a tubehead, control and water cooler. The tubehead, which is supported on a gantry stand, consists of a high-voltage transformer, a filament transformer and X-ray tube housed in a cylindrical steel container insulated with sulphur hexafluoride.—*Farrar Boilerworks Ltd., Newark-on-Trent, Notts.*

Compressor leaflet

A NEW three-colour leaflet describing the Hymatic - Hydrovane portable compressor type 72P has been recently issued.

Designed particularly to meet the needs of local authorities, public utilities and specialist contractors for an economical highly portable one-tool compressor, the 72P is basically a towable version of the company's 98P100 Hydrovane mobile compressor, in extensive use throughout the world.—*Hymatic Engineering Co. Ltd., Redditch, Worcs.*